

1. Work requester fills out this section.

☐ Standing Work Permit

Requester: Don Lynch	Date: 1/11/2006	Ext.: 2253	Dept/Div/Group: PO/PHENIX
Other Contact person (if different from requester): Sal Marino			Ext.: 3704
Work Control Coordinator: Don Lynch		Start Date: 1/12/2006	Est. End Date: 2/28/2006
Brief Description of Work: Install MPC South Detector in MMS piston cavity			
Building: 1008	Room: IR	Equipment: MPC	Service Provider: PHENIX

2. WCC, Requester/Designee, Service Provider, and ES&H (as necessary) fill out this section or attach analysis

<b>ES&amp;H ANALYSIS</b>					
<b>Radiation Concerns</b>		<input checked="" type="checkbox"/> None	<input type="checkbox"/> Activation	<input type="checkbox"/> Airborne	<input type="checkbox"/> Contamination
Radiation Generating Devices:		<input type="checkbox"/> Radiography	<input type="checkbox"/> Moisture Density Gauges	<input type="checkbox"/> Soil Density Gauges	<input type="checkbox"/> X-ray Equipment
<input type="checkbox"/> Special nuclear materials involved, notify Isotope Special Materials Group			<input type="checkbox"/> Fissionable materials involved, notify Laboratory Criticality Officer		
<b>Safety Concerns</b>		<input type="checkbox"/> None	<input type="checkbox"/> Ergonomics	<input type="checkbox"/> Transport of Haz/Rad Material	
<input type="checkbox"/> Adding/Removing Walls or Roofs	<input type="checkbox"/> Confined Space*	<input type="checkbox"/> Explosives	<input type="checkbox"/> Lead*	<input type="checkbox"/> Penetrating Fire Walls	
	<input type="checkbox"/> Corrosive	<input type="checkbox"/> Flammable	<input type="checkbox"/> Magnetic Field*	<input type="checkbox"/> Pressurized Systems	
<input type="checkbox"/> Asbestos*	<input type="checkbox"/> Cryogenic	<input type="checkbox"/> Fumes/Mist/Dust*	<input type="checkbox"/> Material Handling	<input type="checkbox"/> Rigging/Critical Lift	
<input type="checkbox"/> Beryllium*	<input type="checkbox"/> Electrical	<input type="checkbox"/> Heat/Cold Stress	<input type="checkbox"/> Noise*	<input type="checkbox"/> Toxic Materials*	
<input type="checkbox"/> Biohazard*	<input checked="" type="checkbox"/> Elevated Work*	<input type="checkbox"/> Hydraulic	<input type="checkbox"/> Non-ionizing Radiation*	<input type="checkbox"/> Vacuum	
<input type="checkbox"/> Chemicals*	<input type="checkbox"/> Excavation	<input type="checkbox"/> Lasers*	<input type="checkbox"/> Oxygen Deficiency*	<input checked="" type="checkbox"/> Other: Working near beampipe	
* Does this work require medical clearance or surveillance from the Occupational Medicine Clinic? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No					
<b>Environmental Concerns</b>		<input checked="" type="checkbox"/> None	<input type="checkbox"/> Work impacts Environmental Permit No.		
<input type="checkbox"/> Atmospheric Discharges (rad/non-rad)	<input type="checkbox"/> Land Use	<input type="checkbox"/> Soil Activation/contamination	<input type="checkbox"/> Waste-Mixed		
<input type="checkbox"/> Chemical or Rad Material Storage or Use	<input type="checkbox"/> Liquid Discharges	<input type="checkbox"/> Waste-Clean	<input type="checkbox"/> Waste-Radioactive		
<input type="checkbox"/> Cesspools (UIC)	<input type="checkbox"/> Oil/PCB Management	<input type="checkbox"/> Waste-Hazardous	<input type="checkbox"/> Waste-Regulated Medical		
<input type="checkbox"/> High water/power consumption	<input type="checkbox"/> Spill potential	<input type="checkbox"/> Waste-Industrial	<input type="checkbox"/> Underground Duct/Piping		
Waste disposition by:		<input type="checkbox"/> Other			
<b>Pollution Prevention (P2)/Waste Minimization Opportunity:</b>		<input checked="" type="checkbox"/> None <input type="checkbox"/> Yes			
<b>FACILITY CONCERNS</b>		<input checked="" type="checkbox"/> None			
<input type="checkbox"/> Access/Egress Limitations	<input type="checkbox"/> Electrical Noise	<input type="checkbox"/> Potential to Cause a False Alarm	<input type="checkbox"/> Vibrations		
	<input type="checkbox"/> Impacts Facility Use Agreement	<input type="checkbox"/> Temperature Change	<input type="checkbox"/> Other		
<input type="checkbox"/> Configuration Control	<input type="checkbox"/> Maintenance Work on Ventilation Systems	<input type="checkbox"/> Utility Interruptions			
<b>WORK CONTROLS</b>					
<b>Work Practices</b>					
<input type="checkbox"/> None	<input type="checkbox"/> Exhaust Ventilation	<input type="checkbox"/> Lockout/Tagout	<input type="checkbox"/> Spill Containment	<input type="checkbox"/> Security (see Instruction Sheet)	
<input type="checkbox"/> Back-up Person/Watch	<input type="checkbox"/> HP Coverage	<input type="checkbox"/> Posting/Warning Signs	<input type="checkbox"/> Time Limitation	<input type="checkbox"/> Other	
<input type="checkbox"/> Barricades	<input type="checkbox"/> IH Survey	<input type="checkbox"/> Scaffolding-requires inspection	<input type="checkbox"/> Warning Alarm (i.e. "high level")		
<b>Protective Equipment</b>					
<input type="checkbox"/> None	<input type="checkbox"/> Ear Plugs	<input checked="" type="checkbox"/> Gloves	<input type="checkbox"/> Lab Coat	<input type="checkbox"/> Safety Glasses	
<input type="checkbox"/> Coveralls	<input type="checkbox"/> Ear Muffs	<input type="checkbox"/> Goggles	<input type="checkbox"/> Respirator	<input type="checkbox"/> Safety Harness	
<input type="checkbox"/> Disposable Clothing	<input type="checkbox"/> Face Shield	<input checked="" type="checkbox"/> Hard Hat	<input type="checkbox"/> Shoe Covers	<input type="checkbox"/> Safety Shoes	<input type="checkbox"/> Other
<b>Permits Required (Permits must be valid when job is scheduled.)</b>					
<input checked="" type="checkbox"/> None	<input type="checkbox"/> Cutting/Welding	<input type="checkbox"/> Impair Fire Protection Systems			
<input type="checkbox"/> Concrete/Masonry Penetration	<input type="checkbox"/> Digging/Core Drilling	<input type="checkbox"/> Rad Work Permit-RWP No			
<input type="checkbox"/> Confined Space Entry	<input type="checkbox"/> Electrical Working Hot	<input type="checkbox"/> Other			
<b>Dosimetry/Monitoring</b>					
<input checked="" type="checkbox"/> None	<input type="checkbox"/> Heat Stress Monitor	<input type="checkbox"/> Real Time Monitor	<input type="checkbox"/> TLD		
<input type="checkbox"/> Air Effluent	<input type="checkbox"/> Noise Survey/Dosimeter	<input type="checkbox"/> Self-reading Pencil Dosimeter	<input type="checkbox"/> Waste Characterization		
<input type="checkbox"/> Ground Water	<input type="checkbox"/> O <sub>2</sub> /Combustible Gas	<input type="checkbox"/> Self-reading Digital Dosimeter	<input type="checkbox"/> Other		
<input type="checkbox"/> Liquid Effluent	<input type="checkbox"/> Passive Vapor Monitor	<input type="checkbox"/> Sorbent Tube/Filter Pump			
<b>Training Requirements (List below specific training requirements)</b>					
<b>Based on analysis above, the Walkdown Team determines the risk, complexity, and coordination ratings below:</b>			<b>If using the permit when all hazard ratings are low, only the following need to sign: ( Although allowed, there is no need to use back of form)</b>		
<b>ES&amp;H Risk Level:</b>	<input type="checkbox"/> Low	<input checked="" type="checkbox"/> Moderate	<input type="checkbox"/> High	WCC:	Date:
<b>Complexity Level:</b>	<input type="checkbox"/> Low	<input checked="" type="checkbox"/> Moderate	<input type="checkbox"/> High	Service Provider:	Date:
<b>Work Coordination:</b>	<input type="checkbox"/> Low	<input checked="" type="checkbox"/> Moderate	<input type="checkbox"/> High	Authorization to start	Date:
(Departmental Sup/WCC/Designee)					

3. Both work requester and service provider contribute to work plan (use attachments for detailed plans)

<b>Work Plan</b> (procedures, timing, equipment, and personnel availability need to be addressed): See attached procedure				
Special Working Conditions Required: None				
Operational Limits Imposed: None				
Post Work Testing Required: No				
Job Safety Analysis Required: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No			Walkdown Required: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
<b>Reviewed by:</b> Primary Reviewer will determine the size of the review team and the other signatures required based on hazards and job complexity. Primary Reviewer signature means that the hazards and risks that could impact ES&H have been identified and will be controlled according to BNL requirements.				
<b>Title</b>	<b>Name (print)</b>	<b>Signature</b>	<b>Life #</b>	<b>Date</b>
Primary Reviewer				
ES&H Professional				
Other				
Other				
Work Control Coordinator	Don Lynch			
Service Provider				
	Review Done: <input type="checkbox"/> in series	<input type="checkbox"/> team		

**4. Job site personnel fill out this section.**

Note: Signature indicates personnel performing work have read and understand the hazards and permit requirements (including any attachments).			
Job Supervisor:		Contractor Supervisor:	
Workers:	Life#:	Workers :	Life#:
Workers are encouraged to provide feedback on ES&H concerns or on ideas for improved job work flow. Use feedback form or space below.			

**5. Departmental Job Supervisor, Work Control Coordinator/Designee**

Conditions are appropriate to start work: (Permit has been reviewed, work controls are in place and site is ready for job.)			
Name:	Signature:	Life#:	Date:

**6. Departmental Job Supervisor, Work Requester/Designee determines if Post Job Review is required.** ☐ Yes ☐ No

Post Job Review (Fill in names of reviewers)			
Name:	Signature:	Life#:	Date:
Name:	Signature:	Life#:	Date:

**7. Worker provides feedback.**

Worker Feedback (use attached sheets as necessary)	
a) WCM/WCC: Is any feedback required? <input type="checkbox"/> Yes <input type="checkbox"/> No	
b) Workers: Are there better methods or safer ways to perform this job in the future? <input type="checkbox"/> Yes <input type="checkbox"/> No	

**8. Closeout: Work Control Coordinator (authorizing dept.) checks quality of completed permit and ensures the work site is left in an acceptable condition. (WCC can delegate clean up of work area to work supervisor)**

Name:	Signature:	Life#:	Date:
Comments:			

**MPC South Detectors  
PHENIX IR, Bldg. 1008**

**Discussion**

A new array of detectors has been designed and built for the PHENIX experiment at the Relativistic Heavy Ion Collider. The design concept for the detectors has been reviewed by appropriate PHENIX technical staff and a safety review by CA safety staff has been conducted during which the concept for this work plan was presented.

The detector is comprised by 8 separate enclosures of 2 generic configurations housing a total of 188 lead tungstate crystals 29 of which are housed in each of 4 wedge shaped corner modules and 18 crystals in each of 4 brick shaped central module. The enclosures provide a light tight environment for the detectors which have dry air supplied in an open loop to maintain a uniform thermal environment. On the exterior of the enclosures in the side facing the IP printed circuit boards are attached, from which signal cables and HV/LV power cables are routed from the front end electronics. LED's are mounted on the opposite face (facing away from IP). The front end electronics are mounted above the center MuTr electronics rack on the "eyebrow".

The detector enclosures will be installed 1 at a time by hand with support from the overhead crane to help support the weight when positioning the module for insertion. The attached diagrams show the order and orientation in which the detector modules are to be inserted.

This work is to be done by fully trained and experienced PHENIX personnel, under the technical supervision of Sal Marino and the engineering cognizance of Don Lynch. The modules will be inserted using an articulated manlift with 2 PHENIX mechanical technicians in the lift to support and insert each module and an additional technician on the ground to operate the crane for load support. The actual mechanical work requires mechanical technician skill of the craft to insert the individual modules, integrate them into a single detector system, align the system to its ultimate position and anchor the assembly at that position.

All persons involved will have appropriate training for working at heights, fall protection and all other relevant training.

**Procedure**

LOTO the power to the MMS magnet coil at the power supply in 1008B. (Pearson)

Assure that the CM is locked in position by locking out the hydraulics to each magnet mover. (Marino)

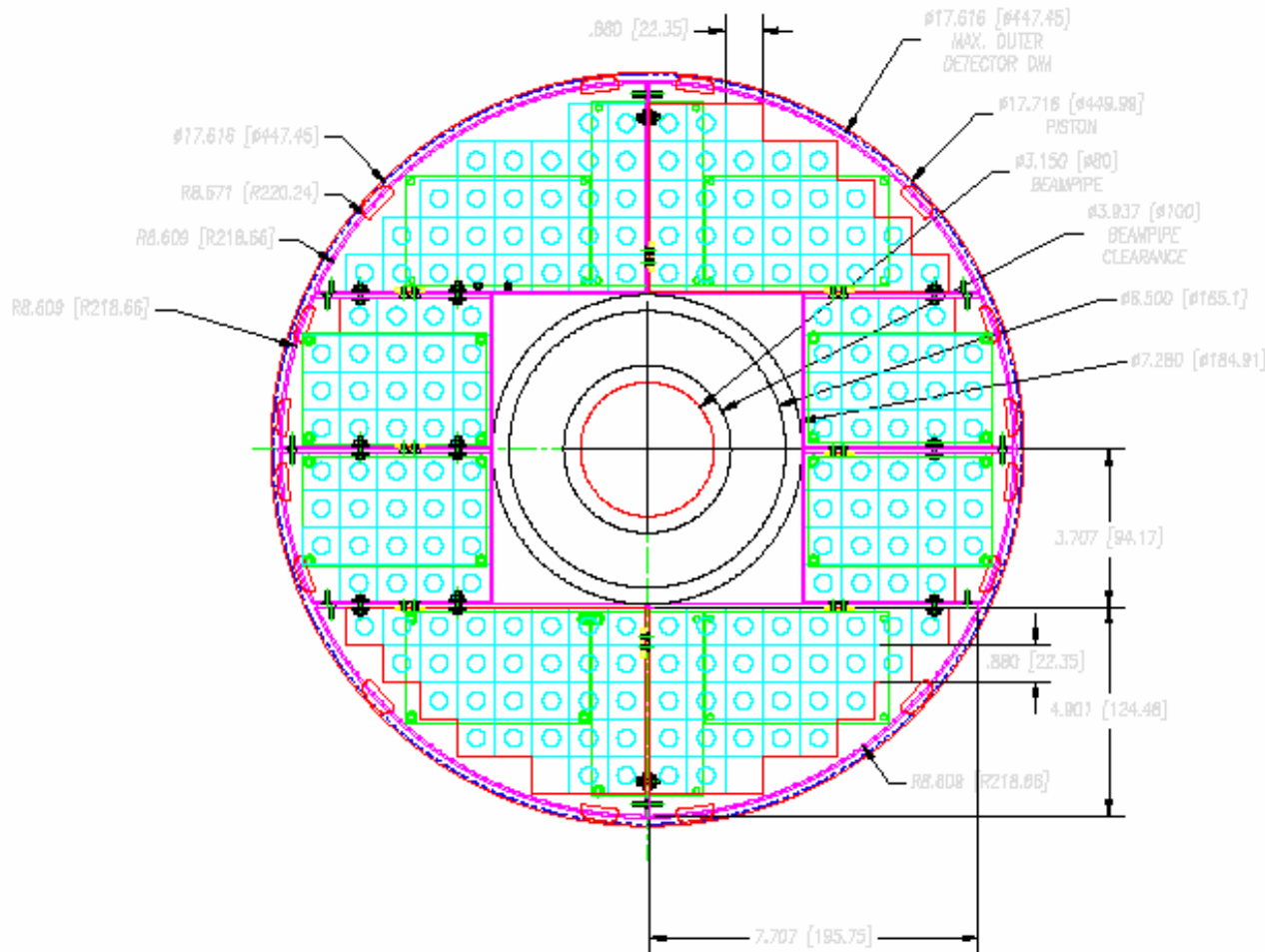
Insert each of the modules individually into the piston cavity using the installation tool shown on the attached sheets and in accordance with the sequence and orientation graphically illustrated on the attached sheets. Maintain extreme care at all times to prevent contact with the beam pipe.

After installing, integrating, positioning and aligning the assembly make sure that all tools and any other foreign matter are removed from the piston hole.

Attach signal and power cables as required and route them into the provided cable tray to the MPC electronics crate.

At this point the MMS magnet may be released from its hydraulics lockout to be moved north to its run position and the detector commissioning may commence.

# MPC Installation

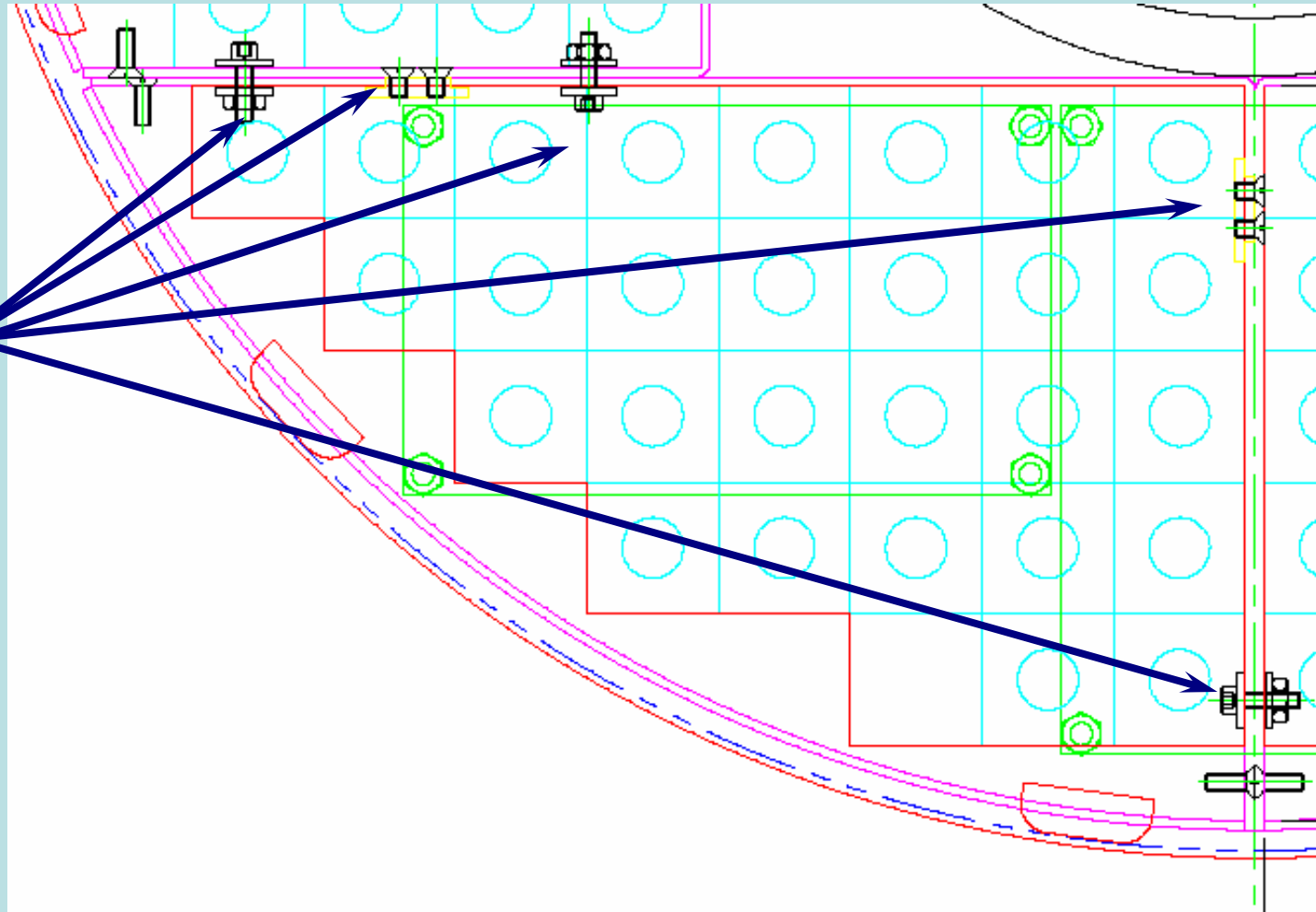


8 modules:

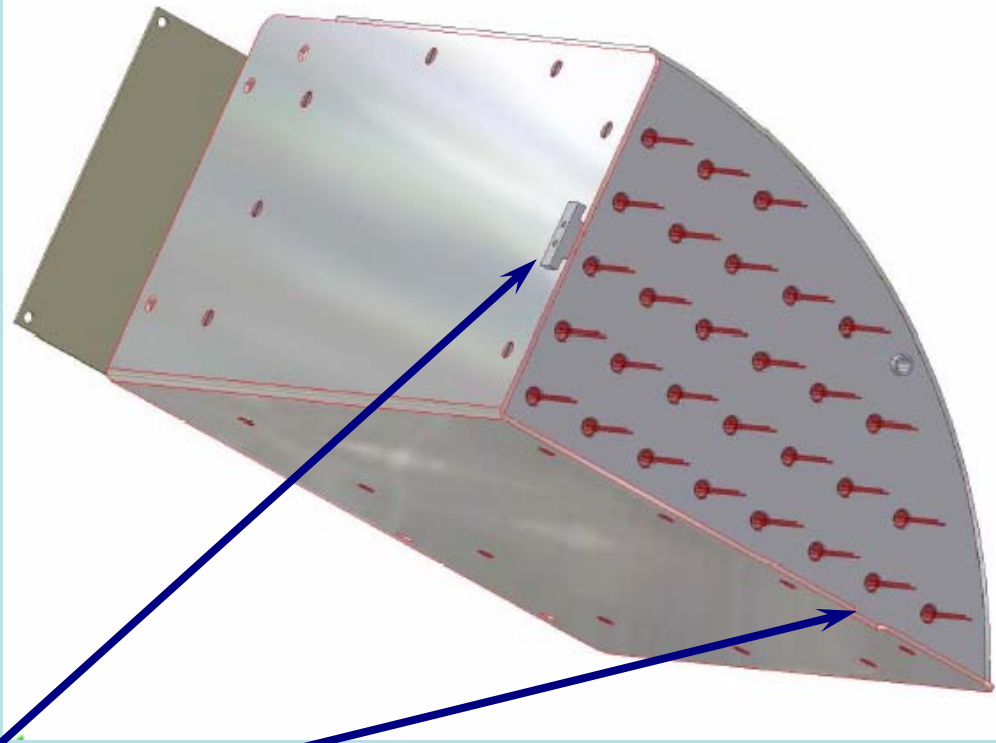
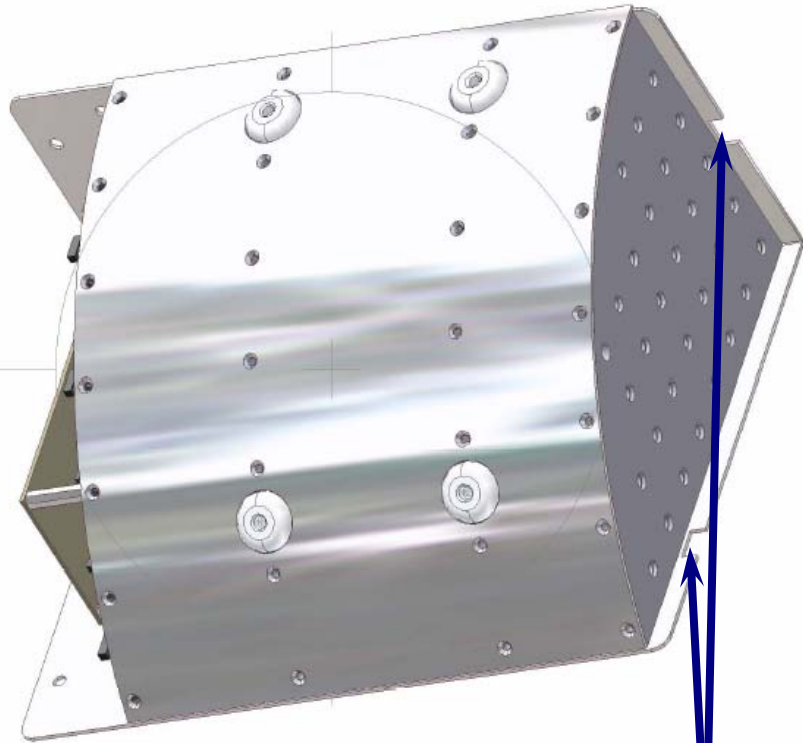
- 4 wedges w/ 29 crystals each
- 4 bricks w/18 crystals each
- 188 crystals total

# MPC Installation

Modules are attached to adjacent modules with tab/slots at rear and screws at front

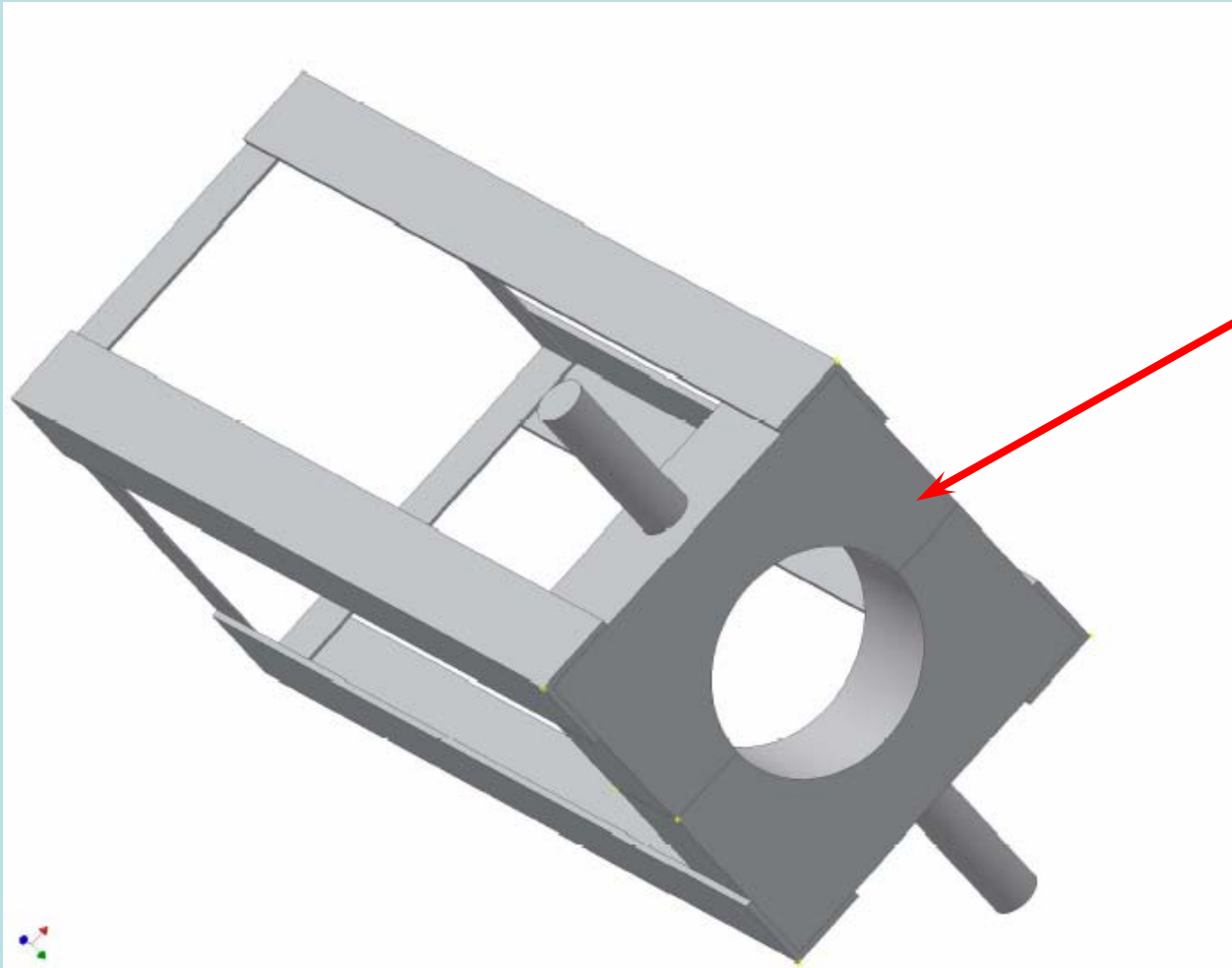


# MPC Installation



**Locking Tabs at rear of modules**

# MPC Installation

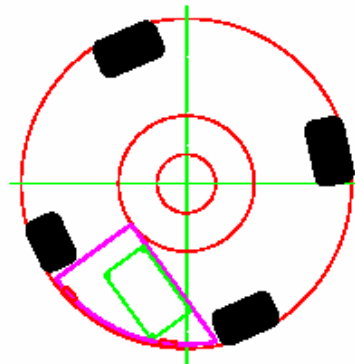


**MPC Installation  
Tool**



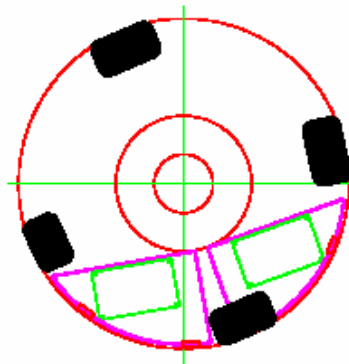
# MPC Installation

**1. Insert lower-west wedge module**



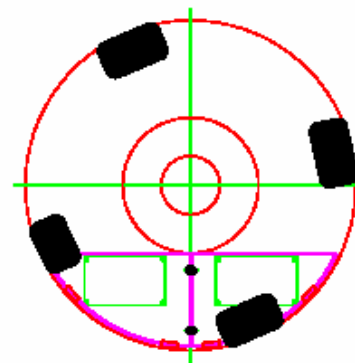
STEP 1

**2. Rotate lower-west wedge module counter-clockwise, insert lower-east module**



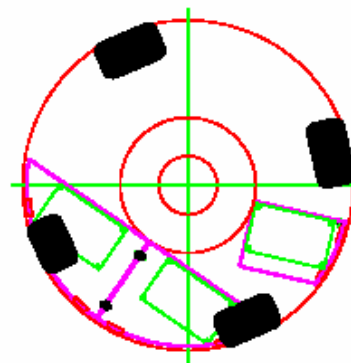
STEP 2

**3. Rotate lower wedge modules to normal position**



STEP 3

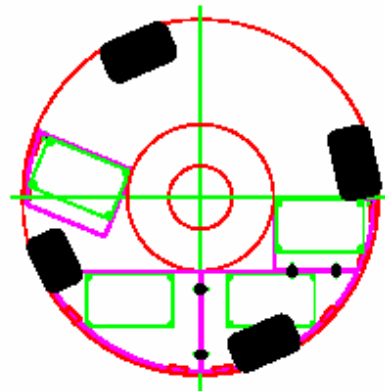
**4. Rotate lower wedge modules clockwise, insert below-center west block module**



STEP 4

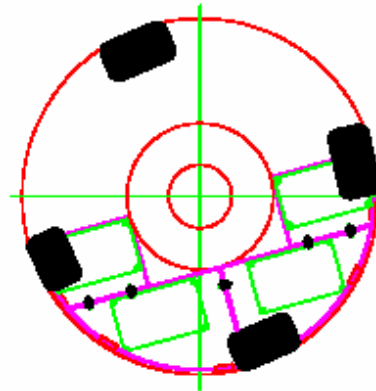
# MPC Installation

5. Rotate modules back to normal position. Insert below-center east block module



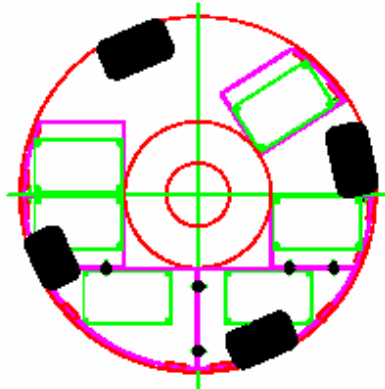
STEP 5

6. Rotate modules counter-clockwise, insert above-center east block module



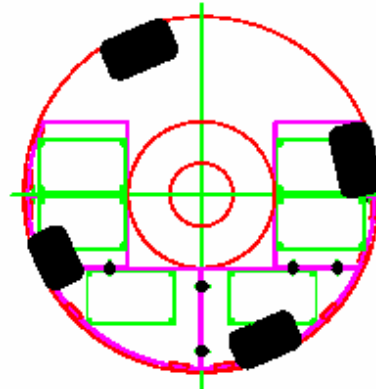
STEP 6

7. Rotate modules to normal position. Insert above-center West block module



STEP 7

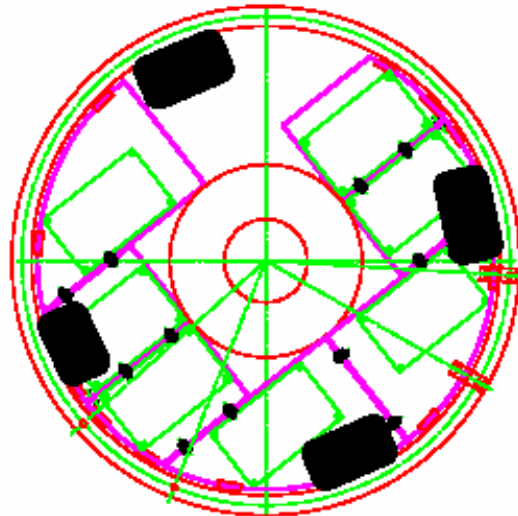
8. Ready for upper wedge modules



STEP 8

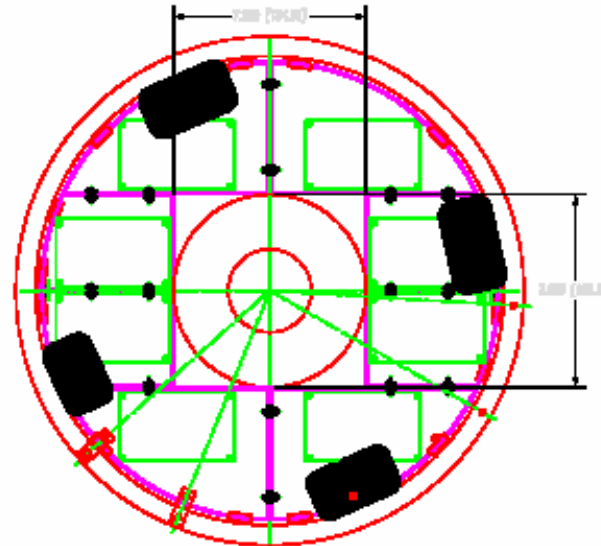
# MPC Installation

9. Rotate modules counter-clockwise. Insert upper east wedge



STEP 9

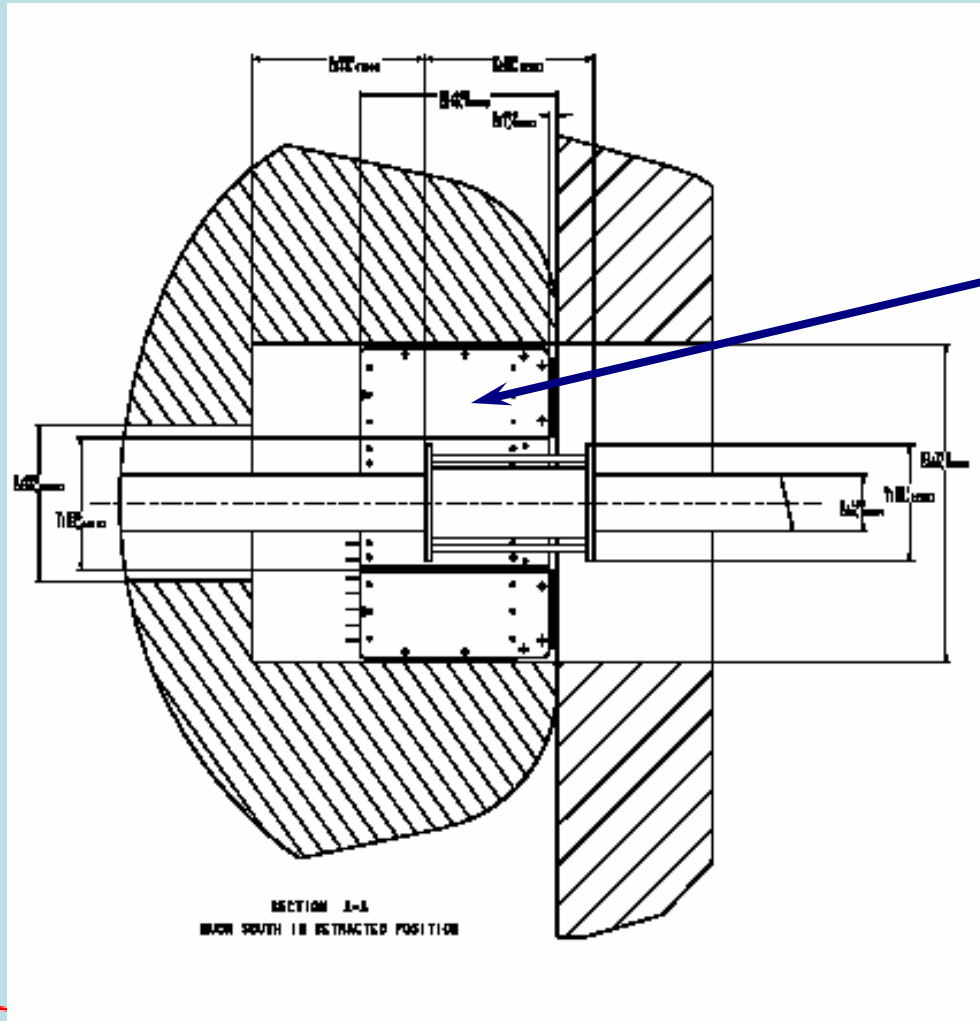
10. Rotate modules clockwise, to normal position. Insert upper-west wedge module



STEP 10

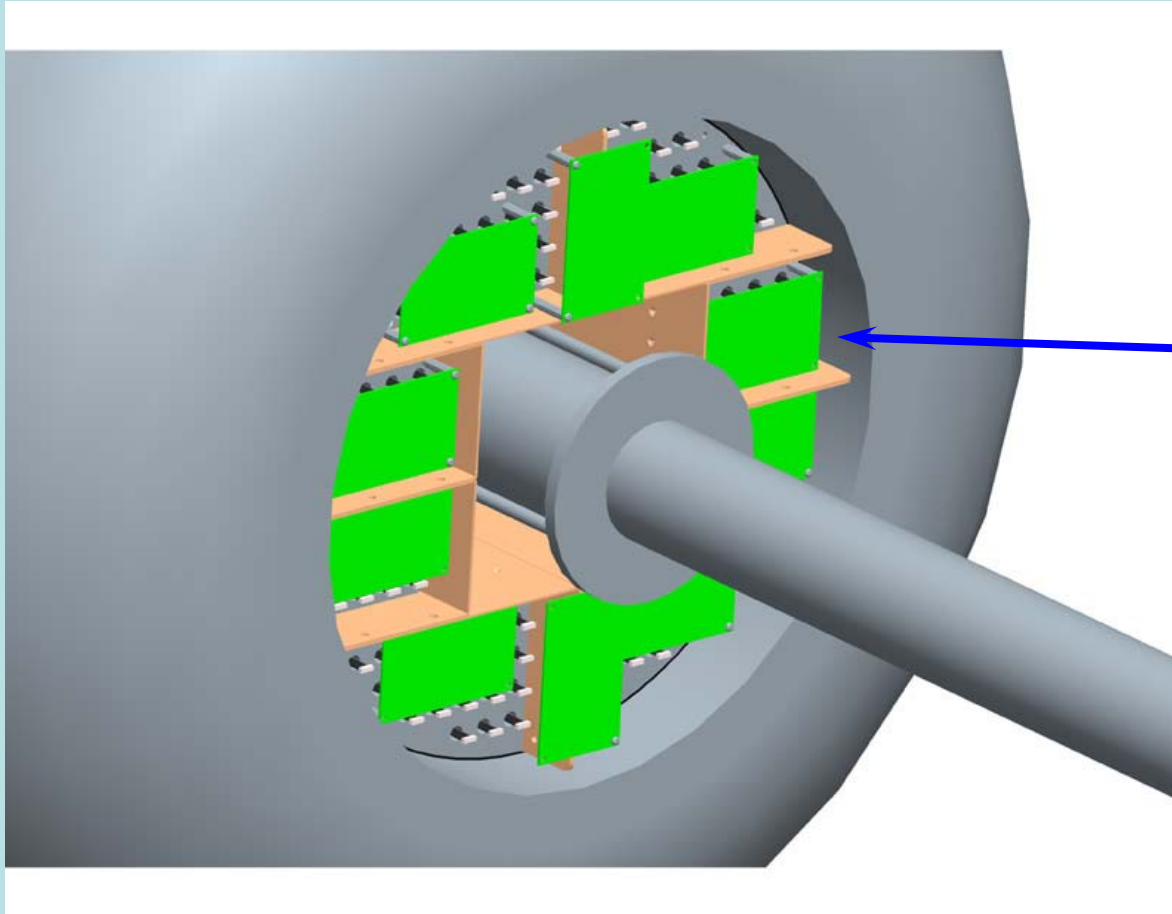
11. Connect cables and gas lines, push assembly to back wall of cavity align and lock in position

# MPC Installation



**MPC after all modules are installed, before moving back in cavity and before being cabled**

# MPC Installation



**MPC after all  
modules are  
installed, before  
moving back in  
cavity and  
before being  
cabled**

**(MuTr Station 1  
omitted for  
clarity)**